



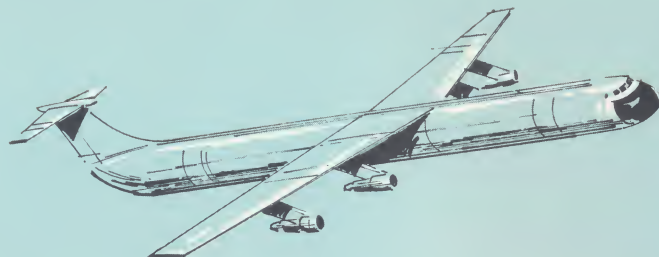
AMPEX TM-13

DIGITAL TAPE MEMORY SYSTEMS

for hostile environments in airborne, shipborne, underwater and mobile on-line or off-line applications

ATM-13 • BTM-13 • GTM-13





MIL-E-5400, Class II



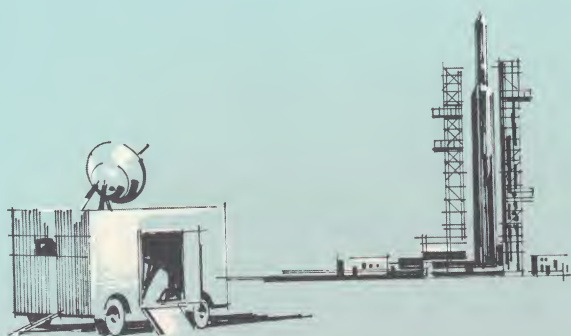
MIL-STD-704

TM-13 DIGITAL TAPE M

MIL-E-16400



- Produce **computer compatible tapes** . . . in 7-track IBM or 9-track ASCII formats . . . off-line or with mobile and airborne computers
- Provide **high degree of tape utilization, broad data input range** . . . continuous character rates to 625 KC, burst rates to 4.0 MC
- **Highly reliable** with minimal adjustment, maintenance . . . due to extreme mechanical simplicity, use of integrated circuits, derated circuit design
- Designed and constructed for **dependable everyday operation** in the extremes of altitude, pressure, humidity, temperature, shock and vibration
- **Easy, safe operation** in a broad range of applications . . . remote controlled for airborne use . . . sealed in rugged cases for isolation from high altitudes
- **Three basic versions**
 - ATM-13:** Airborne Tape Memory System
 - BTM-13:** Buffered Tape Memory System
 - GTM-13:** Geophysical Tape Memory System



MIL-I-6181D

MEMORY SYSTEMS

The new family of Ampex TM-13 Digital Tape Memory Systems allows the recording of digital data in **computer compatible formats** — while operating in hostile environments common to high altitude or various kinds of mobile operation. Tapes recorded on the TM-13 Systems can be fed **directly** to a computer; they are ready for immediate on-line processing as soon as they are made; fast start/stop times allow maximum utilization of tape supplies. For off-line data collection, TM-13 Systems' computer-ready tapes completely eliminate data format conversion.

Heart of TM-13 Systems is a unique new tape drive based on the Ampex single-capstan concept. This drive utilizes a balanced, push-pull dual capstan. Twin vacuum columns (one on each side of the capstan system) maintain uniform tape tension over the record-playback heads. This symmetrical arrangement results in extreme **tape drive stability** . . . and **high tolerance to shock and vibration**. It also allows fast start/stop times and smooth, gentle tape handling. The few mechanical parts used in this transport are mounted on a precision, reinforced, one-piece casting.

Increased reliability (such as never before achieved in this type of tape memory) is offered by TM-13 Systems. Mechanical simplicity, use of integrated circuits and silicon semiconductors throughout, use of "third generation" design technology — ALL CONTRIBUTE to TM-13 Systems' high MTBF and data reliability. Elimination of complex mechanical assemblies (like pinch rollers, adjustable guides, pressure pads, solenoids, arm-type storage loop sensors) make service requirements rare.

ATM-13 AIRBORNE TAPE MEMORY SYSTEM



The ATM-13 is a high-performance AIRBORNE digital tape system designed specifically for on-line or off-line operation in high altitude aircraft. It is capable of recording and reading computer compatible tapes (IBM 7-track or 9-track ASCII) — at character transfer rates up to 60 KC (at 75 ips and 800 cpi). It is also capable of very fast start/stop times (6 milliseconds maximum at 75 ips), assuring maximum tape utilization. It can operate continuously at maximum program rates up to 160 start/stop cycles per second.

Integrated circuits are used throughout the ATM-13 data and control electronics — which are packaged inside the transport case. These electronics are built on compact boards, easily accessible through a front door on the transport. The complete ATM-13 system package, including transport and power supply, occupies a **volume less than 3.2 cubic feet (.091 cubic meter)**.

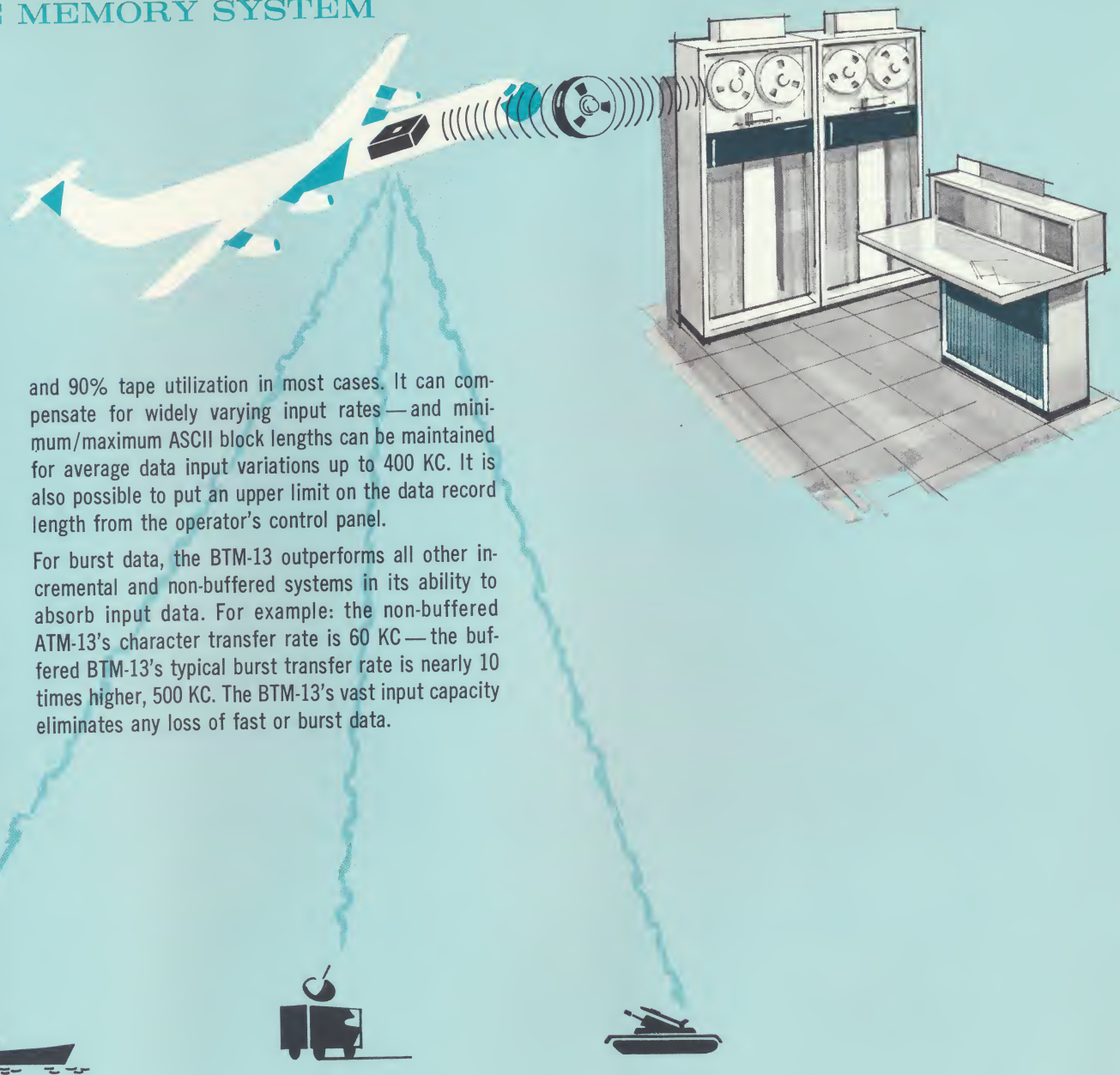
BTM-13 BUFFERED TAPE MEMORY SYSTEM

The BTM-13 is an INTEGRATED DATA STORAGE SYSTEM for recording asynchronous, sporadic data in computer compatible formats. It can record variable rate data at an average rate up to 60 KC and burst data at rates up to 500 KC. Data recorded on the BTM-13 System is ready for **immediate** processing on airborne/shipborne/mobile computers . . . or for post-processing in fixed computer installations.

Highly responsive to varying data rates and sporadic data input, BTM-13 offers **increased recording time** per reel over systems formerly available. It offers **maximum tape utilization** in applications where sporadic bursts of data must be recorded — between 70%

and 90% tape utilization in most cases. It can compensate for widely varying input rates — and minimum/maximum ASCII block lengths can be maintained for average data input variations up to 400 KC. It is also possible to put an upper limit on the data record length from the operator's control panel.

For burst data, the BTM-13 outperforms all other incremental and non-buffered systems in its ability to absorb input data. For example: the non-buffered ATM-13's character transfer rate is 60 KC — the buffered BTM-13's typical burst transfer rate is nearly 10 times higher, 500 KC. The BTM-13's vast input capacity eliminates any loss of fast or burst data.



GTM-13 GEOPHYSICAL TAPE MEMORY SYSTEM

The GTM-13 is a tape memory system designed for the rigors of geophysical digital recording. It is an advanced system . . . ideal for applications like the recording of seismic signals in digital form. Its overall ruggedness and versatile tape speeds (**7.5 to 120 ips**) also lend themselves to hundreds of other uses that require **mass data collection in the field**. Data recorded on the GTM-13 is ready for immediate computation as soon as it is recorded in either 7-track IBM compatible or 9-track ASCII format.

The GTM-13 features two modes: (1) **write** (with read-after-write capability), (2) **read**. It is packaged in two separate, environment-protected units and operates on 24 VDC power. In typical usage, the GTM-13 will accommodate up to 36 records of 10 seconds duration (at 112.5 ips, 800 cpi). For a nominal 5 second signal, recorded at 52.5 ips, approximately 150 records can be recorded on one reel of tape.



ATM-13 PERFORMANCE CHARACTERISTICS



ATM-13 DIGITAL TAPE TRANSPORT

Operating Modes:

Read/Write, Start/Stop, Continuous Read and/or Continuous Write (gapless)

Speeds:

Computer Compatible to 75 ips
Continuous (non start/stop) to 112.5 ips

Rewind Speed: 180 ips maximum

(Note: tape is NOT removed from vacuum chambers during rewind, assuring a smooth, uniform tape pack.)

Heads:

9-track ASCII (IBM 2400 type)
7-track (IBM 729 type)

Recording Densities:

200/556 cpi, NRZI
800 cpi, NRZI

Transfer Rate:

Computer Mode, 60 KC (character rate)
Continuous, 90 KC (gapless format character rate)

Tape Width and Length:

½" by 2400 feet, 1.5-mil thick

Reel Size: 10½" (26.67 cm) IBM type

Data Capacity: 1.8 x 10⁸ bits, maximum (for 1.5-mil, ½-inch tape)

Start/Stop Time: 6.0 ms (at 75 ips) computer mode

Start Time: 0.35 second at 112.5 ips (maximum) continuous mode

Data Reliability:

Transient Error Rate . . . 1 in 10⁷ bits
Permanent Error Rate . . . 1 in 10⁸ bits

Transport Reliability: 2000 hours MTBF

Service Life: 500 hours between maintenance

Weight:

Transport with data and control electronics:
100 pounds max. (45.36 kg max.)

Size:

Transport: less than 2.1 cubic feet (.06 cubic m.)
Power Supply: 1.1 cubic feet max. (.03 cubic m.)

Power Requirements:

208 VAC, 400 cps, 3 phase, 600 watts (average)
(Optional supplies for: 115 VAC, 48–63 cps)

ATM-13500 TAPE MEMORY SYSTEM

The ATM-13500 Series are complete digital tape memories including data and control electronics. These systems can be made available on special order with time shared electronics in a 1 x 2 configuration.

Data Electronics:

DE-500 Series, with integrated circuits

Data Transfer Rate: 90 KC, maximum

Data Electronics Power Requirement: 45 watts

Packaging: Integral with transport; mounted on 2¾" x 3¾" (6.99 cm x 9.52 cm) printed circuit boards

Standard Input and Output Levels:

	FALSE	TRUE
Input Voltage Levels	+2.5 to +4.5 v	−0.5 to +1.2 v
Output Voltage Levels	+2.5 minimum at −2.0 ma	0 to +0.5 v at +20 ma
Input Impedance	3000 ohms, maximum	

Options:

Echo Check	Generate Vertical Parity Check
Rate Error Check	EOT Sense BOT Sense

ATM-13 ENVIRONMENTAL SPECIFICATIONS

Temperature:

Operating	−54°C to +71°C
Non-Operating	−54°C to +80°C

Humidity: 95% R.H. maximum

Altitude: 70,000 feet (21,341 meters)

Vibration:

5 to 20 cycles, 0.1 inch D.A.
20 to 32 cycles, ±2 g's
32 to 72 cycles, 0.036 inch D.A.
72 to 500 cycles, ±10 g's

Shock: 15 g's, 11 ms duration

Linear Acceleration: 6 g's operating, 10 g's non-operating

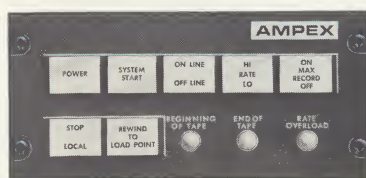
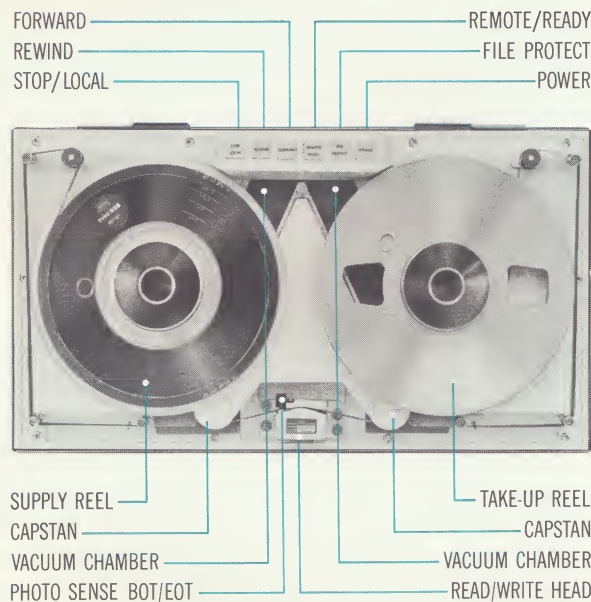
Sound Pressure Levels: 135 db (to be considered a minimum requirement)

Environmental Class: MIL-E-5400-G, Class II

Quality: MIL-Q-9858

RFI: MIL-I-6181D

Source Power: MIL-STD-704



BTM-13 REMOTE CONTROL PANEL

BTM-13 SYSTEM PERFORMANCE CHARACTERISTICS

Input Data Rates (4096 word buffer):

9-track, ASCII format, 1/2" tape: to 420 KC bit rate, 60 KC character rate
7-track, IBM format, 1/2" tape: to 420 KC bit rate, 60 KC character rate

Input Burst Data Rates:

8-track, 1/2" tape: to 4.0 MC bit rate, 500 KC character rate

Burst Data Duration (4096 word buffer):

500 KC (word rate) for 8 ms
308 KC (word rate) for 13 ms
100 KC (word rate) for 40 ms

Buffer Pulse Repetition Rate (4096 word buffer):

1/15 second

Recording Formats

IBM (0.75" IRG), ASCII (0.6" IRG), with 1.3 to 48 inch block length

Standard Input and Output Levels:

(Same as ATM-13)

Tape Utilization: 67% to 99.7%, with optional upper limit of 87%

Physical Volume:

	WITHOUT POWER SUPPLY	WITH POWER SUPPLY
Volume	2.1 cubic feet 0.06 cubic meter	3.9 cubic feet 0.11 cubic meter
Weight	110 pounds 50.0 kilograms	160 pounds 72.7 kilograms

Power Requirement: 650 watts

Temperature and Vibration: MIL-E-5400, Class II

RFI: MIL-I-6181D

Source Power: MIL-STD-704

GTM-13 SYSTEM PERFORMANCE CHARACTERISTICS

Modes of Operation:

Write (with Read-After-Write capability)
Read (for locating single characters on the tape)

Tape Speeds: 7.5 to 112.5 ips with remote switching for any speed pair of two-to-one ratio (for example, 52.5 ips-105 ips)

Start/Stop Times:

0.25 second at 52.5 ips
0.35 second at 105 ips

Tape: 1/2", 1.5-mil polyester, 2400 feet

Heads:

9-track ASCII (IBM 2400 type)
7-track (IBM 729 type)

Recording Format: NRZ gapless format, 800 cpi max.

Logic Levels (SLT standard, others optional):

	FALSE	TRUE
Input Voltage Levels	+2.5 v min.	+1.2 v max.
Output Voltage Levels	+2.5 v min.	+0.5 v max.

Size and Weight:

	LENGTH	WIDTH	HEIGHT	WEIGHT
Transport	25" 63.5 cm	14" 33.56 cm	12 1/4" 31.12 cm	100 lbs 45.36 kg
Power Supply	24" 60.9 cm	14" 35.56 cm	8" 20.82 cm	50 lbs 22.68 kg

Power Requirements: 24 VDC, ± 3 volts

Environmental Specifications:

Operating Temperature 0°C to 50°C
Non-Operating Temperature -54°C to +55°C
Humidity 10% to 85% R.H.
Altitude 7500 feet (2,287 meters) maximum
Vibration and Shock MIL-E-5400, Class II



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